

Report on Japanese Stomatopoda with  
Descriptions of Two New Species.

BY

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(With Plate IV).

The present report is based mainly upon the material contained in the collection of the Zoological Institute of the College of Science, Imperial University of Tokyo, to which some specimens from other sources were supplemented. In all I have been able to examine fourteen species, referable to six genera, as follows: *Protosquilla* 2, *Gonodactylus* 3, *Odontodactylus* 1, *Pseudosquilla* 1, *Lysiosquilla* 3, and *Squilla* 3 species. Of these one species each of *Gonodactylus* and *Lysiosquilla* seems to be new to science. The larval forms are not included in this report.

I wish here to express my hearty thanks to Prof. A. Oka for his kind supervision during the course of my study as well as for enabling me to consult most of the literature on the subject.

Genus *Protosquilla* Brooks.

1. *Protosquilla cerebralis* Brooks.

*Protosquilla cerebralis* Brooks, Rep. Voy. Challenger XVI, ii, p. 72, PL. XIV. Fig. 2, 3; Pl. XVI. Fig. 2, 3 (1886).—Borradaile, Proc. Zool. Soc. London, p. 33, Pl. V, Fig. 6 a (1898).

Remarks.—The specimens examined, although agreeing in essential points with the original description and figures given by Brooks, present following differences:—

i) The telson is only a little broader than long, whereas it is twice as broad as long in Brook's specimens.

ii) The fifth thoracic segment at least is exposed dorsally, whereas this segment is completely covered by the carapace in his specimens.

iii) The antero-lateral corners of the carapace are somewhat angular, while they are more rounded in his specimens.

Locality.—One male and three females from Okinawa.

## 2. *Protosquilla brooksii* de Man.

Pl. IV., Figs. 1, 1 a.

*Protosquilla brooksii* de Man, Arch. f. Naturg. 53. Jahrg. I p. 579, Pl. XXII a, Fig. 8 (1887).

Remarks.—In the present specimen the spinules on the last two segments are much more numerous than in the original specimens described by de Man; viz., there are upon each of the submedian tubercles of the sixth segment more than ten spinules, and upon each of the lateral tubercles more than twenty spinules, whereas the original specimens are recorded to possess only one or two spinules upon the former and only one upon the latter. The anterior margin, instead of being smooth, bears several spinules. The median tubercle on the telson, the tip of which does not reach the base of the median notch, is provided with about thirty spinules (about nine in the type-specimens), and the lateral tubercles are each provided with about thirty spinules (about ten in the type-specimens). Moreover, the inner lobe of the posterior margin of telson is armed with nearly ten, instead of two, and the lateral margin of the large triangular notch each with eleven or twelve, instead of six, spinules. Lastly, more than twenty spinules are present on the area between the lateral tubercle and the outer margin, the latter being also beset with thirteen or fourteen spinules, while in the type-specimens there are present only from six to eight and from four to five spinules respectively. These differences,

however, do not seem to be conspicuous enough to justify the establishing of a distinct species, and I prefer to regard my specimen as belonging to the species referred to, with which it agrees nearly in all other details.

While living the whole dorsal surface of body and of the longest segment of raptorial limb is coloured brownish green, sprinkled with dark green spots. The lateral portions of the carapace, the exposed thoracic and abdominal segments as well as the dorsal surface of the longest segment of raptorial limb are marked by a pattern of light bluish green colour. The antennules and antennae are vermilion fading into light blue. The flagellae are of a vermilion colour also. Lively green colouring of the tubercles on the last two segments does not occur in the specimen.

The single female specimen measures 395 mm in length.

Locality.—Takanoshima in the gulf of Tateyama, Prov. Awa.

Genus *Gonodactylus* Latreille.

### 3. *Gonodactylus chiragra* (Fabricius).

*Gonodactylus chiragra*, Miers, Ann. and Mag. Nat. Hist. (5) V, p. 118, (1880)—Brooks, Rep. Voy. Challenger, XVI, ii, p. 56, Pl. XV. Fig. 4 (1886)—Jurich, Die Stomatopoden der Deutschen Tiefsee-Expedition, p. 375, Pl. XXVI [II], Figs. 4, 5 (1904).

*Gonodactylus smithii*, Pocock, Ann. and Mag. Nat. Hist. (6) XI, p. 475. Pl. XX, B, Fig. 1 (1893)

Locality—Nineteen males and seven females from Okinawa; two females from the Ogasawara (Bonin) Islands; one male and one female from the Seven Islands, Prov. Idzu. There are also one male and two females from Okinawa, which show in the ornamentation of the last two segments the characteristic features of *G. smithii* Pocock.

### 4. *Gonodactylus glabrous* Brooks.

- Gonodactylus glabrous*, Brooks, Rep. Voy. Challenger, XVI, ii, p. 62, Pl. XIV. Fig. 5; Pl. XV, Figs 7, 9 (1886)—Jurich, Die Stomatopoden der Deutschen Tiefsee Expedition, p. 376 (1904).
- Gonodactylus graphurus*, de Man, Arch. für Naturg. 53 Jahrg. I, p. 573 (1887)

Remarks.—Brooks, when he first founded this species, gave several points of detail, by which this species might be distinguished from *G. graphurus*. Among them the following seem to be the more important:—

- i) Sutures upon the first five abdominal segments absent.
- ii) Dorsal median carina absent upon the sixth abdominal segment.
- iii) All the dorsal carinæ upon the last two segments more sharply defined and less swollen and rounded than they are in *G. graphurus*.

In all my specimens (one male and seven females) the length of telson is nearly equal to its width and its general outline resembles Brook's figure of *G. glabrous*. The transverse sutures on the first five abdominal segments are lacking. But the median carina, characteristic of *G. graphurus* occurs upon the sixth abdominal segment also, though it is in some cases only very faintly marked. Besides, some specimens show the lateral longitudinal sutures upon the first five abdominal segments; and the five carinæ upon the dorsal elevation of the telson are in some individuals like those of *G. glabrous* as described and figured by Brooks. In some other specimens these carinæ rather resemble those of *G. graphurus*. Thus, many of the chief distinctive characteristics between the two species appear to be of doubtful value, and consequently it would be more advisable to regard these two forms as varieties of one and the same species.

Locality.—Five females from Okinawa; one male and two females from the Ogasawara Islands.

**5. *Gonodactylus spinosocarinatus* n. sp.**

Pl. IV. Figs 2, 2 a.

Diagnosis.—Body elongated. Antennules and antennae short, antennal scales small. Rostrum with a slender median spine and acute antero-lateral angles. Carapace slightly vaulted, with rounded corners. Hind body strongly convex; first five abdominal segments smooth above, with marginal carinae, the sixth provided with six unarmed longitudinal carinae. The whole dorsal surface of telson, except the flattened submedian marginal spines, covered with nine broad longitudinal carinae, which are smooth above but beset with numerous minute spinules on the sides. Only the submedian spines well developed, the others being obsolete. Basal prolongation of uropod with broad and flattened outer spine; some of the marginal spines on the proximal segment of exopodite large and curved.

Description—The rostrum is transverse, with acute median spine, the tip of which does not reach halfway the length of eye-peduncle; antero-lateral spines also with acute terminations. The carapace is slightly convex; its length about  $1/5$  the total length of body, and  $1\frac{1}{2}$  the width between the antero-lateral angles, which is about equal to that of the sixth thoracic segment. The gastric sutures are well-marked, diverging a little posteriorly. All angles are obtuse and rounded. The posterior margin is straight, but the antero-lateral lobes project forward. The hind body is strongly convex and elongated; the fifth thoracic segment slightly narrows laterally; the lateral edges of the next two segments are truncated, while the last segment produces a blunt process on each side. The first abdominal segments increase gradually in length backwards; they are smooth above and are provided with lateral marginal carinae. All the postero-lateral angles are rounded and do not project backward. The length of the sixth segment is almost equal to that of the second and is provided with six somewhat irregularly-marked longitudinal carinae, the space

between them being uneven. The submedian carinae are parallel and broad; the intermediate carinae divergent, with their ends scarcely reaching the posterior margin; the lateral carinae run nearly parallel to the latter. All carinae are devoid of spines at their extremities.

The telson is a little longer than broad, the maximum length being  $\frac{2}{15}$  the total length; the vertical diameter exceeds half the horizontal diameter as in *G. spinosus* Bigelow. The whole dorsal surface except on the submedian spines, is completely covered with nine broad longitudinal carinae, of which the median one is the broadest. In the median carina three parts are recognizable: a prominent smooth part on the median line and a pair of spinulated parts lying postero-lateral to the former. This carina alone reaches the base of the median notch posteriorly, the others stopping at some distance in front of its margin. The next three pairs, of which the inner two unite posteriorly, are nearly equal in breadth. The marginal carina is the narrowest and is shorter than the others. All these carinae are smooth except at the lateral borders where they are provided each with a row of minute prickles. The posterior end of the carinae is also armed with a few spinules directed obliquely backward. The postero-lateral margins of telson are divided each into three teeth, though at first sight they appear to be simple. The outermost tooth is the end of the marginal carina, the intermediate that of the lateral, while the innermost tooth represents the submedian spine. The last mentioned is the only well developed marginal spine, having no carina upon it and the movable tip being directed upward. The lateral margins of the large triangular median notch are armed each with thirteen minute spinules. Besides, there is a spinule on the outer margin of the submedian spine.

The basal segment of uropod bears on the dorsal surface a row of three or four spines besides the terminal one. The outer spine of the basal prolongation is broad and flattened, curved inward, and has

no teeth on the inner margin; the inner one is nearly straight and acute. The marginal spines on the proximal segment of exopodite are five to six in number, of which the first two or three are slender and straight, lying at some distance from one another; the others are stout, curved forward and diminish gradually in size backward. The distal segment articulates with the dorsal surface of the proximal segment. The endopodite is somewhat curved outward. Antennules and antennae short, nearly equal in length; the antennal scales are much shorter than the length of eye, which is equal to  $5/13$  the length of the carapace. The manus of raptorial limb is beset with a row of minute spinules on the inner margin and near the base.

Colour.—The alcoholic specimens show no characteristic colouring except on the dactylus of raptorial limb and the marginal spines of uropod, all which are rosy red.

Size.—The larger female measures 28.5 mm in length.

Locality.—Two female specimens from Jōgashima, Prov. Sagami.

Genus *Odontodactylus* Bigelow.

#### 6. *Odontodactylus japonicus* (de Haan)

*Gonodactylus japonicus*, de Haan, Faun. Japon. Crustacea, p. 225, Pl. LI. fig. 7 (1849)—Miers, Ann. and Mag. Nat. Hist. (5) V, p. 116 (1880)

*Odontodactylus japonicus*, Bigelow, Proc. U.S. Nat. Mus. XVII, p. 496 (1894)

Locality.—One female from Tateyama, Prov. Awa; one male and two females from Sagami Sea.

Genus *Pseudosquilla* Guérin.

#### 7. *Pseudosquilla ciliata* Miers.

*Pseudosquilla stylifera*, Dana, U. S. Expl. Exp., XIII, Crustacea I, p. 622 Pl. XLI, fig. 4 (1852)

*Pseudosquilla ciliata*, Miers, Ann. and Mag. Nat. Hist. (5) V, p. 108, Pl. III, figs 7, 8 (1880)—Brooks, Rep. Voy. Challenger XVI, ii, p. 53, Pl. XV, fig. 10 (1886)—de Man, Zool. Jahrb. Abt. Syst. X, p. 694 (1898).

Locality.—Two females from Ogasawara Islands.

Genus *Lysiosquilla* Dana.

### 8. *Lysiosquilla acanthocarpus* (Gray).

*Lysiosquilla acanthocarpus*, Miers, Ann. and Mag. Nat. Hist. (5) V, p. 11, Pl. I, figs 7-9 (1880)—Jurich, Die Stomatopoden der Deutschen Tiefsee-Expedition, Pl. XXVI [II], fig. 3 (1904).

Locality.—One male from Tateyama, Prov. Awa.

### 9. *Lysiosquilla maculata* (Fabricius).

Pl. IV. fig. 3.

*Lysiosquilla maculata*, Miers, Ann. and Mag. Nat. Hist. (5) V, p. 5, Pl. I, figs 1, 2 (1880)—Brooks, Rep. Voy. Challenger, XVI, ii, p. 45, Pl. I, figs 1-7 (1886).

Remarks.—The sexual character observed by various authors in this species is not very apparent in the present specimen, for, in spite of its being a female, the dentition on the dactylus of raptorial limb looks like that of the male, as figured by Miers and Brooks. This, however, may be due to immaturity, as the individual examined measures only 17.5 cm. in length.

Locality.—Okinawa (?)

### 10. *Lysiosquilla crassispinosa* n. sp.

Pl. IV., figs 4, 4a.

Diagnosis.—Eyes with the corneal region nearly globular. The manus of raptorial limb bearing, besides the usual serration, ten or more acute jointed spines on the inner margin; the dactylus armed



with ten teeth including the terminal one. Rostrum triangular, terminating in an acute median spine. Carapace smooth, with all its angles rounded. Last two thoracic and first two abdominal segments provided with a pair of inconspicuous carinae. All abdominal segments with their postero-lateral angles ending in spines. The whole dorsal surface of the last two segments and a part of that of the fifth abdominal segment, covered with irregularly shaped granules. Eight stout spines or lobes on the postero-lateral margin of telson, the median crest of which is broad and somewhat obscurely defined. The inner spine of the dorsal prolongation of uropod much longer than the outer.

Description.—The rostrum is of a long triangular shape with the apex terminating in an acute spine. The carapace is smooth; its length measures about  $\frac{1}{6}$  the total length, the maximum breadth about  $1\frac{1}{3}$  the length. The gastric sutures are obvious and diverge posteriorly, while the cervical suture is only faintly marked. The anterior margin is nearly straight, the posterior sinuate, with all the angles evenly rounded and without spines. The lateral parts of the carapace are bent downward, so that the lateral margins are not visible from the dorsal side. There is a shallow groove along the margin throughout the whole length. Of the thoracic segments the last two are provided each with an obscurely defined longitudinal carina running near the margin. Lateral edges of the sixth segment bear each a flattened triangular spine, and those of the seventh are produced into a short acute spine at their extremities. All the segments of the abdomen have each an acute spine at the postero-lateral angles, and there is a conspicuous impression along the anterior margin. The first two segments possess a faintly marked carina close to the lateral margin. The sixth segment is covered with granules of irregular shape throughout the entire dorsal surface; further there exist a pair of low submedian carinae which posteriorly converge a little and the terminal spines of which do not reach the posterior margin. The fifth segment is likewise ornamented with granules in its postero-intermediate parts.

The length of the telson, measured on the median line, is a little more than  $1/6$  the total length, the maximum breadth being about  $2/5$  the length. The median crest is low and broad with a short terminal spine. The postero-lateral margin is armed with eight thickened spines or lobes, which are covered with minute perforations and have each a short jointed spinule at the extremity. The median notch is beset with minute spinules along its lateral borders. The whole dorsal surface of the telson, except on the median crest and the marginal spines, is covered with irregularly shaped granules, similar to those on preceding segments. The basal segment of the uropod bears a curved acute spine at the posterior extremity. Of the two prolongations, the inner one is much longer and broader than the other. The two segments of the exopodite are about equal in length. There are eleven marginal spines on the proximal segment, of which the last two or three terminate bluntly. The surface of the distal segment bears a strongly defined elevation and depression. The endopodite is comparatively large and its surface is irregularly sculptured.

The eyes are directed obliquely forward; the corneal region is nearly globular and without constriction, its axis making an acute angle with that of the peduncle on the inner side of the latter. The ophthalmic segment is entirely covered by the rostrum. The antennules have broad and flattened basal segment. The carpus of the raptorial limb bears two acuminate spines on its anterior surface. The inner margin of the manus is provided with a row of ten (left) or eleven (right) acute jointed spines besides the usual serration; moreover, there are two long movable spines at the base. The dactylus bears ten long curved teeth, the terminal one being much longer and more strongly curved than the others.

All appendages of the exposed thoracic segments are styliform with the distal parts somewhat flattened.

The genital openings of the female presents a somewhat characteristic appearance as shown in fig. 4 a.

Colour.—The alcoholic specimen is without any characteristic colouring.

Size.—Total length 29, 7 cm.

Locality.—The single female specimen was taken in the Sagami Sea.

Genus *Squilla* Fabricius.

### 11. *Squilla fasciata* de Haan.

*Squilla fasciata*, de Haan, Fauna Japon. Crustacea, p. 224, Pl. LI, fig. 4 (1849)—Miers, Ann. and Mag. Nat. Hist. (5) V, p. 29 (1880)—Brooks, Rep. Voy. Challenger, XVI, ii, p. 37, Pl. III, fig. 4, 5; Pl. II, fig. 8. (1886).

*Chloridella fasciata*, Rathbun, Proc. U. S. Nat. Mus. XXVI, p. 54 (1903).

Colour.—The ground colour is grayish, besprinkled with minute dark spots. All the carinæ upon the exposed thoracic segments as well as the intermediate carinæ of abdominal segments are dark yellowish green. There is a pattern of light red colour upon each of the spaces between the three lateral pairs of carinæ in the first five abdominal segments. Besides, the following parts are also coloured light red:—the lateral spines of the sixth thoracic segment, the marginal spines of the telson, the movable spines at the margin of the uropod, the margins of the endopodite and of the distal segment of the exopodite of the uropod, and the outer surface of the more proximal segments of from the second to fifth maxillipedes.

Locality.—One male and two females from Prov. Harima.

### 12. *Squilla leptosquilla* Brooks.

*Squilla leptosquilla*, Brooks, Rep. Voy. Challenger, XVI, ii, p. 30, Pl. I, fig. 1, 2 (1886)—Jurich, Die Stomatopoden d. Deutschen Tiefsee-Exped. p. 370, Pl. XXV [I], fig. 1, 2 (1904)

Remarks.—Jurich has founded a variety (var. *dentata*) upon his specimens taken at a depth of 296 metres near Great Nicobar, which

differed from the type in the more slender form of the intermediate and lateral spines of the telson. The specimens before me stand in this respect between the type and the said variety; particularly the three smaller individuals (59-64 mm. in length) seem to be nearer the var. *dentata* than to the typical species.

Locality.—Five males from Kagoshima.

### 13. *Squilla affinis* Berthold.

*Squilla oratoria*, de Haan, Fauna Japon. Crustacea, p. 223, Pl. LI, fig. 2 (1849)

*Squilla nepa*, Brooks, Rep. Voy. Challenger, XVI, ii, p. 25 (1886)

*Squilla affinis*, Bigelow, Proc. U. S. Nat. Mus. XVII, p. 538, fig. 22 (1894)

*Chloridella affinis*, Rathbun, Proc. U. S. Nat. Mus. XXVI, p. 55 (1903).

Colour.—In the live state the ground colour of the body is grayish, besprinkled with minute dark spots. The dorsal surface is marked with brilliant colours in the following manner:— The lateral margins and a part of the anterior margin of the carapace is light green; the median carina as well as a part of the posterior margin dark red. Anterior and posterior margins of exposed thoracic and abdominal segments light green, the submedian carinae reddish, the intermediate carinae of the abdominal segments partly also reddish. The median tubercles upon the abdominal segments are purple. The telson has the dorsal median crest bluish green, the marginal spines red, the carinae upon these dark purple, and the secondary spinules bluish green. In the basal segment of the uropod the longitudinal carina is green and the spines of its prolongation reddish, the space between the bases of these spines being light blue. The proximal segment of the exopodite is light green and its marginal spines are red, the distal segment being orange yellow, bordered with dark markings on the inner margin. The corneal region of the eye is brilliantly coloured.

with greenish black. Antennules and antennae are marked with bands of light red and light black; the antennal scales are light blue with a yellow tint near the extremity. The raptorial limb is also coloured blue and orange. There is no sexual difference in colour,

Locality.—One male from Tokyo; one female from Prov. Sagami; several males and females from Prov. Harima; two males and one female from Oita, Prov. Bungo; two males and one female from the Ogasawara Islands; one male and two females from Formosa; one male from the Pescadores Islands; and three males and females from unknown locality.

#### 14. *Squilla costata* de Haan.

*Squilla costata*, de Haan, Faun. Japon. Crustacea, p. 223, Pl. LI, fig. 5 (1849).—Miers, Ann. and Mag. Nat. Hist. (5) V, p. 21 (1880).

*Chloridella costata*, Rathbun, Proc. U. S. Nat. Mus. XXVI, p. 55 (1903).

Locality.—One male from Misaki.

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# Explanation of Plate IV.

Fig. 1. *Protosquilla brooksii* de Man. Dorsal view of the last three segments, ♀.  $\times 3$ .

Fig. 1 a. Lateral view of the last four segments of the same specimen.  $\times 3$ .

Fig. 2. *Gonodactylus spinosocarinatus* n. sp., ♀.  $\times 4$ .

Fig. 2 a. The last two segments of the same specimen.  $\times 8$ .

Fig. 3. *Lysiosquilla maculata* (Fabricius). Dactylus of the right raptorial limb, ♀.  $\times 1$ .

Fig. 4. *Lysiosquilla crassispinosa* n. sp., ♀.  $\times 1/2$ .

Fig. 4 a. Female genital opening of the same specimen.  $\times 1$ .